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ABSTRACT

This manual consists of 10 lesson plans for use by instructors teaching a private pilot ground school course. Addressed in the individual lesson plans are the following topics: aerodynamics and principles of flight, flight instruments and systems, operational publications, regulations, airplane operations, engine operations, radio communications, aviation weather, navigation, and cross country planning. Each lesson plan contains some or all of the following: unit title, presentation time, major presentation methods used in the lesson, a terminal performance objective, enabling objectives, student evaluation criteria, references, materials needed, required safety precautions, suggested homework assignments, preparation and revision dates, and a series of instructor notes that are cross-referenced to a lesson outline. (MN)

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INSTRUCTOR'S GUIDE

FOR A

PRIVATE PILOT GROUND SCHOOL

COURSE

by

RICHARD M. SCHLENKER

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
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FORWARD

This manual was designed for use by instructors teaching a private pilot ground school. It includes lesson plans intended for use in ten three-hour sessions. Subjects covered during the lessons were derived from subject matter categories published by the Federal Aviation Administration (FAA) for the private pilot written examination. These are the areas with which prospective private pilots must demonstrate minimum written competence before they may be issued a private pilot certificate by the FAA. All of the published private pilot subject matter categories are covered by these lessons.

LESSON PLAN COVER SHEET

SCHOOL: Flight Training Systems

COURSE: Private Pilot Ground School

WEEK / UNIT NUMBER / TITLE: 1/1.0/Aerodynamics and Principles of Flight

LESSON NUMBER / TITLE: 1.1/Aerodynamics and Principles I

PRESENTATION TIME: 3 hours

PRESENTATION METHODS: Lecture; Practical Exercise

TERMINAL PERFORMANCE OBJECTIVES: Upon completion of this lesson, students should be able to:

1.1.1 ANSWER correctly 80% of the questions in the private pilot written examination categories 001-009;020;021.

ENABLING OBJECTIVES: Upon completion of this lesson, students should be able to:

1.1.1.1 DESCRIBE the laws of motion.

1.1.1.2 DESCRIBE how flight controls function.

1.1.1.3 EXPLAIN lift, drag and angle of attack.

1.1.1.4 DESCRIBE the effects of ice, frost and snow on airfoils

EVALUATION: Students will be evaluated regarding their competence with the objectives of this lesson based upon the results of a mini-exam administered at the beginning of week 2. The minimum acceptable level of performance is 80%.

REFERENCES:

1. Kirshner, W. K. The Student Pilot's Manual. Iowa State University Press, 1979.
2. Flight Standards Service Flight Traning Handbook. U. S. Department of Transportation, Washington, D. C., 1980.
3. ASA Private Pilot Test Book. Seattle, WA: Aviation Supplies and Academics, Inc., 1984.

MATERIALS REQUIRED:

1. Chalk
2. Chalkboard
3. Marker
4. Flipchart
5. Toy airplane
6. One sheet of paper for each student
7. Slide projector or overhead projector
8. Slides or overhead projections

SAFETY PRECAUTIONS:

None

HOMEWORK:

1. In references 1 and 2, read the sections dealing with the laws of motion, flight controls, airfoils, lift, drag, angle of attack, flaps, effects of ice, snow and frost on airfoils.
2. Study the questions in reference 3 relevant to this lesson.
3. Prepare for a mini-exam over this lesson.

PREPARATION DATE:

January, 1984.

REVISION DATES:

1. September 1984.
2. April, 1985.

LESSON TITLE Aerodynamics and Principles I

INSTRUCTOR NOTES

1. Prior to introducing this lesson, have each student build and fly a paper airplane. Have the students change the position of the control surfaces and then observe the effects upon flight.

LESSON OUTLINE

I. INTRODUCTION

A. TITLE: Aerodynamics and Principles I

B. OBJECTIVES: Upon completion of this lesson, students should be able to:

1. Describe the laws of motion.
2. Describe how flight controls function.
3. Explain lift, drag and angle of attack.
4. Describe the effects of ice, frost and snow on airfoils.

C. EVALUATION: Students will be evaluated regarding their competence with the objectives of this lesson based upon the results of a mini-exam administered at the beginning of week 2.

D. PRESENTATION OVERVIEW: The following subjects are discussed during this session:

1. Laws of Motion.
2. Functions of flight controls.
3. Principles of airfoils.
4. Wing platforms.
5. Forces acting on an airplane.
6. Flight controls and axes of an airplane.
7. Lift and drag during turns.
8. Lift versus angle of attack.
9. Lift and thrust versus air density.
10. Types and effects of flaps and spoilers.

INSTRUCTOR NOTES	LESSON OUTLINE
	11. Effect of flaps on lift, drag and trim. 12. Effect of ice, snow and frost on airfoils. E. VALUE OF THE PRESENTATION: An understanding of aerodynamics is essential to flight safety.
11. Use the toy airplane during the presentation to demonstrate angle of attack and so on.	II. PRESENTATION A. Laws of Motion 1. Bernoulli. 2. Newton. B. Functions of the flight controls C. Principles of Airfoils 1. Pressures above and below. 2. Relative wind and angle of attack. 3. Downwash. 4. Wingtip vortices. D. Wing planform 1. Area/span/chord 2. Aspect ratio/taper/sweepback 3. Effect of planform on stall patterns E. Forces Acting on an Airplane 1. Lift 2. Drag-induced/parasite 3. Thrust 4. Weight 5. Centrifugal/centripetal

INSTRUCTOR NOTES	LESSON OUTLINE

F. Flight Controls/Axes of an airplane

G. Lift/Drag during turns

1. Angle of attack.

2. Adverse yaw/aileron drag.

H. Lift versus angle of attack

I. Lift/thrust versus air density

J. Types/effect of flaps, spoilers

K. Effect of flaps on lift/drag/trim

L. Effect of ice/snow/frost on airfoils.

III. SUMMARY

A. Review briefly the main points covered during the discussions of:

1. Laws of motion.

2. Flight controls functions.

3. Airfoil principles.

4. Wing platforms.

5. Forces.

6. Flight controls and axes.

7. Lift and drag.

8. Angle of attack and lift.

9. Air density, thrust and lift.

10. Flaps and spoilers.

11. Ice, snow and frost.

LESSON PLAN COVER SHEET

SCHOOL: Flight Training Systems

COURSE: Private Pilot Ground School

WEEK / UNIT NUMBER / TITLE: 2/1.0/Aerodynamics and Principles of Flight

LESSON NUMBER / TITLE: 1.2/Aerodynamics and Principles II

PRESENTATION TIME: 1.5 Hours

PRESENTATION METHODS: Lecture

TERMINAL PERFORMANCE OBJECTIVES: Upon completion of this lesson, students should be able to:

1.2.1 ANSWER correctly 80% of the private pilot written examination questions in categories

ENABLING OBJECTIVES: Upon completion of this lesson, students should be able to:

1.2.1.1 EXPLAIN the application of power in climbs, level flight and descents.

1.2.1.2 DESCRIBE gyroscopic principles and torque effect.

1.2.1.3 LIST the types and effects of drag.

1.2.1.4 DESCRIBE ground effect.

1.2.1.5 EXPLAIN propeller principles.

1.2.1.6 DESCRIBE stalls and spins.

1.2.1.7 EXPLAIN load factors.

1.2.1.8 EXPLAIN stability.

EVALUATION: Students will be evaluated regarding their competence with the objectives of this lesson based upon the results of a mini-exam administered at the beginning of week 3. The minimum acceptable level of performance is 80%.

REFERENCES:

1. Kirsnner, W. K., The Student Pilot's Manual. Iowa State University Press, 1979.

MATERIALS REQUIRED:

1. Chalk
2. Chalkboard
3. Marker
4. Flipchart
5. Overheat projector
6. Overhead projections
7. One copy of the mini-exam covering last week's lesson for each student.
8. Toy airplane

SAFETY PRECAUTIONS:

None

HOMEWORK:

1. In references 1 and 2 read the sections relevant to the application of power, gyroscopic principles, torque effect, drag, ground effect, propeller principles, stalls, spins, loads, load factors and stability.
2. Study the questions in reference 3 related to this lesson.
3. Prepare for a mini-exam covering this lesson.

PREPARATION DATE:

January, 1984.

REVISION DATES:

1. January, 1985
2. April 17, 1985

INSTRUCTOR NOTES

I. Prior to introducing this lesson, administer the mini-exam covering the material presented last week.

LESSON OUTLINE

I. INTRODUCTION

A. TITLE: Aerodynamics and Principles II

B. OBJECTIVES: Upon completion of this lesson, students should be able to:

1. Explain the application of power in climbs, level flight and descents.
2. Describe gyroscopic principles and torque effect.
3. List the types and effects of drag.
4. Describe ground effect.
5. Explain propeller principles.
6. Describe stalls and spins.
7. Explain load factors.
8. Explain stability.

C. EVALUATION: Students will be evaluated regarding their competence with the objectives of this lesson based upon the results of a mini-exam administered at the beginning of week 3.

D. PRESENTATION OVERVIEW: The following topics are presented during this session:

1. Power in climbs, level flights and descents.
2. Gyroscopic principles and torque effect.
3. Induced and parasitic drag.
4. Ground effect.
5. Principles of propellers.
6. Stalls and spins.

INSTRUCTOR NOTES	LESSON OUTLINE
	7. Loads and load factors. 8. Airplane stability. E. VALUE OF THE PRESENTATION: Safe private pilots have a good understanding of the basics of aerodynamics and principles of flight.
II. Use the toy airplane, during this part of the lesson, to demonstrate various flight attitudes and so on.	II. PRESENTATION A. Power versus climb/descent/level flight B. Gyroscopic principles/torque effect C. Types and effects of drag - induced/parasite/profile D. Ground Effect E. Principles of propellers F. Stalls/spins G. Loads/load factors H. Stability - static and dynamic/longitudinal/lateral/directional
	III. SUMMARY A. Review briefly the main points discussed in: 1. Power, climb, level flight and descent. 2. Gyroscopic principles and torque effect. 3. Drag. 4. Ground effect. 5. Principles of propellers. 6. Stalls and spins. 7. Loads. 8. Stability.

LESSON PLAN COVER SHEET

SCHOOL: Flight Training Systems

COURSE: Private Pilot Ground School

WEEK / UNIT NUMBER / TITLE: 2/2.0/Flight Instruments and Systems

LESSON NUMBER / TITLE: 2.1/Flight Instruments and Systems

PRESENTATION TIME: 1.5 hours

PRESENTATION METHODS: Lecture

TERMINAL PERFORMANCE OBJECTIVES: Upon completion of this lesson, students should be able to:

2.1.1 ANSWER correctly 80% of the questions in private pilot written examination categories R01-R12.

ENABLING OBJECTIVES: Upon completion of this lesson, students should be able to:

2.1.1.1 DESCRIBE the functioning of the attitude indicator, heading indicator, turn indicator/coordinator, altimeter, vertical speed indicator, pitot-static and vacuum systems, and the magnetic compass.

2.1.1.2 LIST the sources of errors in basic flight instruments.

2.1.1.3 DESCRIBE the significance of setting the altimeter.

2.1.1.4 DESCRIBE the significance of pressure attitude.

EVALUATION: Students will be evaluated regarding their competence with the objectives of this lesson based upon the results of a mini-exam administered at the beginning of week 3. The minimum acceptable level of performance is 80%.

REFERENCES:

1. Kirshner, W. K. The Student Pilots Manual. Iowa State University Press, 1979.

2. Flight Standards Service Flight Training Handbook. U. S. Department of Transportation, Washington, D. C., 1980.

3. ASA Private Pilot Test Book. Seattle, WA: Aviation Supplies and Academics, Inc., 1984.

MATERIALS REQUIRED:

1. Chalk
2. Chalkboard
3. Marker
4. Flipchart
5. Overhead projector
6. Overhead projections

SAFETY PRECAUTIONS:

None

HOMEWORK:

1. In references 1 and 2, read the sections dealing with attitude indicators, heading indicators, vertical speed indicator, pitot-static and vacuum systems, and the magnetic compass.
2. Study the questions in reference 3 relevant to this lesson.
3. Prepare for a mini-exam covering this lesson.

PREPARATION DATE:

April, 1984.

REVISION DATES:

1. April 15, 1985

INSTRUCTOR NOTES	LESSON OUTLINE

I. INTRODUCTION

A. TITLE: Flight Instruments and Systems

B. OBJECTIVES: Upon completion of this lesson, students should be able to:

1. Describe the functioning of the attitude indicator, heading indicator, turn indicator/coordinator, altimeter, vertical speed indicator, pitot-static and the vacuum systems, and the magnetic compass.

2. List the sources of errors in basic flight instruments.

3. Describe the significance of setting the altimeter.

4. Describe the significance of pressure attitude.

C. EVALUATION: Students will be evaluated regarding their competence with the objectives of this lesson based upon their performance on a mini-exam administered at the beginning of week 3.

D. PRESENTATION OVERVIEW: The following subjects will be discussed during this session.

1. Basic flight instruments.

2. Altimeter settings.

3. Pressure attitude.

E. VALUE OF THE PRESENTATION: Airplanes cannot be flown safely unless pilots have a good understanding of how the basic flight instruments function.

II. PRESENTATION

A. Attitude Indicator

INSTRUCTOR NOTES	LESSON OUTLINE
	B. Heading Indicator. C. Turn Indicator/Coordinator. D. Altimeter Operation/Errors. E. Vertical Speed Indicator. F. Airspeed Indicator Operation/Error. G. Vacuum Systems/Instruments. H. Pitot-Static Systems/Instruments. I. Magnetic Compass Operation/Errors. J. Altimeter Setting Procedure/Significance. K. Pressure Altitude Significance/Computation. III. SUMMARY A. Review briefly the main points covered in topics A-K of the presentation section.

LESSON PLAN COVER SHEET

SCHOOL: Flight Training Systems

COURSE: Private Pilot Ground School

WEEK / UNIT NUMBER / TITLE: 3/3.0/Flight Information

LESSON NUMBER / TITLE: 3.1/Operational Publications

PRESENTATION TIME: 2 hours

PRESENTATION METHODS: Lecture; Practical Exercise

TERMINAL PERFORMANCE OBJECTIVES: Upon completion of this lesson, students should be able to:

3.1.1 ANSWER correctly 80% of the Private Pilot written examination questions in categories 101-108; J01-J30.

ENABLING OBJECTIVES: Upon completion of this lesson, students should be able to:

3.1.1.1 LIST the types of information found in the Airman's Information Manual (AIM)

3.1.1.2 DESCRIBE the types of information provided to the public via graphic notices

3.1.1.3 DEFING NOTAM

3.1.1.4 LIST the types of information found in NOTAMS

3.1.1.5 LOCATE specific information in the airport/facility directory

3.1.1.6 LIST according to series number, the types of information found in FAA advisory circulars, series 00,20,60,70 and 90.

EVALUATION: Students will be evaluated regarding their competence with the objectives of this lesson, at the beginning of week 4. The minimum acceptable level of competence on the mini-exam is 80%.

REFERENCES:

1. Kirshner, W. K. The Student Pilots Manual. Iowa State University Press, 1979.
2. Flight Standards Service, Flight Training Handbook. U. S. Department of Transportatio. Washington, D. C., 1980.
3. ASA Private Pilot Test Book. Seattle, WA: Aviation Supplies and Academics, Inc., 1984.

MATERIALS REQUIRED:

1. Chalk
2. Chalkboard
3. Marker
4. Flip chart
5. One copy of the quiz covering last weeks lesson, for each student
6. One copy of AIM for each student
7. Examples of graphic notices
8. Copies of NOTAMS
9. A copy of an airport/facility directory for every two students
10. Examples of FAA advisory circulars

SAFETY PRECAUTIONS:

None

HOMEWORK:

1. In references 1 and 2, read the sections dealing with AIM, Graphic Notices, NOTAMS, airport/facility directory, FAA advisory circulars.
2. Study questions in reference 3 relevant to this lesson.
3. Prepare for a mini-exam over this lesson.

PREPARATION DATE:

April, 1984.

REVISION DATES:

1. April 11, 1985.

INSTRUCTOR NOTES	LESSON OUTLINE
	I. INTRODUCTION A. TITLE: Flight Information/Operational Publications B. OBJECTIVES: Upon completion of this lesson, students should be able to: 1. List the types of information found in the Airmens Information Manual (AIM) 2. Describe the types of information provided to the public via graphic notices. 3. Define NOTAM 4. List the types of information found in NOTAMS 5. Locate specific information in the airport/facility directory. 6. List according to series number, the types of information found in FAA advisory circulars, series 00, 20, 60, 70 and 90.
II. A. Students look up specific information in AIM.	II. PRESENTATION A. AIM - BASIC FLIGHT INFORMATION AND ATC PROCEDURES: 1. Pilot controller glossary 2. Airport lighting/marking/aids 3. Air navigation radio aids 4. VOR (VHF omnidirectional range) 5. VOR receiver check 6. VHF direction finder 7. Radar 8. Visual approach slope indicator (VASI)

INSTRUCTOR NOTES	LESSON OUTLINE
	9. Rotating beacons 10. Runway markins 11. Controlled/uncontrolled airspace 12. Operating at nontower airports 13. Special use airspace - prohibited, restricted, alert areas, military operations areas. 14. Services available to pilots 15. Aeronautical advisory stations (UNI-COM, MULTICOM) 16. Automatic terminal information service (ATIS) 17. ATC departure en route/arrival procedures 18. Radar traffic information service 19. Transponder operation 20. Terminal control area 21. Terminal radar program for VFR aircraft 22. Airport operations/tower controlled airports/nontower airports 23. Radiotelephone phraseology/technique 24. Light signals 25. Traffic/wind direction indicators/ taxi-ing 26. Weather information/briefing 27. VFR flight plans 28. En route flight advisory service 29. Transcribed weather broadcasts

INSTRUCTOR NOTES	LESSON OUTLINE

30. Scheduled weather broadcasts
31. In-flight weather advisories/PIREPS
32. Clear air turbulence
33. Thunderstorms
34. Airframe icing
35. Altimetry
36. Pilots automatic telephone weather answering service (PATWAS)
37. ADIZ and designated mountainous areas
38. Wake turbulence
39. Pilot/controller roles/responsibilities
40. Medical facts for pilots
41. Fatigue
42. Hypoxia
43. Hyperventilation
44. Alcohol
45. Carbon monoxide
46. Good operating practices
47. Safety, accident, and hazard reports
48. Emergency procedures

B. GRAPHIC NOTICES AND SUPPLEMENTAL DATA:

1. Parachute jumping areas
2. Military training routes
3. Special operations-olive branch routes

INSTRUCTOR NOTES	LESSON OUTLINE

4. Terminal area graphic notices

5. Terminal radar service areas (TRSAs)

C. NOTICES TO AIRMEN (NOTAMS)

1. Specials

D. AIRPORT/FACILITY DIRECTORY

1. Airport/heliport data/seaplane bases

2. VOR receiver checkpoints

3. FSS-CS/T and national weather service telephone numbers

4. Aeronautical chart bulletin

5. Special notices

E. FAA ADVISORY CIRCULARS:

1. Series 00 - General

2. Series 20 - Aircraft

3. Series 60 - Airmen

4. Series 70 - Airspace

5. Series 90 - Air Traffic Control and General Operations

III. SUMMARY

A. Review briefly, the main points covered during the discussion of:

1. AIM - Basic flight information and ATC procedures

2. Graphic notices and supplemental data

3. Notices to airmen (NOTAMS)

4. Airport facility directory

5. FAA Advisory circulars

LESSON PLAN COVER SHEET

SCHOOL: Flight Training Systems

COURSE: Private Pilot Ground School

WEEK / UNIT NUMBER / TITLE: 3/3.0/Flight Information

LESSON NUMBER / TITLE: 3.2/Regulations-FAR's, CFR's

PRESENTATION TIME: 1 hour

PRESENTATION METHODS: Lecture; Practical Exercise

TERMINAL PERFORMANCE OBJECTIVES: Upon completion of this lesson, students should be able to:

3.2.1 ANSWER correctly 80% of the private pilot written examination questions in Categories A01-A19; B01-B19; C01-C36; D01-D37; E01-E08; H01-H05.

ENABLING OBJECTIVES: Upon completion of this lesson, students should be able to:

3.2.1.1 DESCRIBE the contents of 14 CFR parts 1, 61, 71, 91 and 49 CFR part 830.

3.2.1.2 LOCATE information relative to private pilots in 14 CFR 1, 61, 71 and 91.

3.2.1.3 DESCRIBE the contents andpurposes of 49 CFR part 830.

EVALUATION: Students will be evaluated regarding their competence with the objectives of this lesson at the beginning of week 4. The minimum acceptable level of performance is 80%.

REFERENCES:

1. Kirshner, W. K. The Student Pilots Manual. Iowa State University Press, 1979.
2. Flight Standards Service Flight Training Handbook. U. S. Department of Transportation, Washington, D.C., 1980.
3. ASA Private Pilot Test Book. Seattle, WA: Aviation Supplies and Academics, Inc., 1984.
4. Federal Aviation Regulations.

MATERIALS REQUIRED:

1. CHalk
2. CHalkboard
3. Marker
4. Flip chart
5. One copy of the quiz over last week's material for each student.

SAFETY PRECAUTIONS:

None

HOMEWORK:

1. In references 1 and 2, read the sections dealing with the Federal Aviation Regulations.
2. Read parts 1, 61, 71 and 91 in reference 4.
3. Study the questions in reference 3 relevant to this lesson.
4. Prepare for a mini-exam over this lesson.

PREPARATION DATE:

April 10, 1984

REVISION DATES:

1. April 12, 1985

INSTRUCTOR NOTES

1. Prior to introducing the lesson for this week, administer the quiz covering the material from last week.

LESSON OUTLINE

I. INTRODUCTION

A. TITLE: Regulations - FAR's, CFR's

B. OBJECTIVES: Upon completion of this lesson, students should be able to:

1. Describe the contents of 14 CFR Parts 1, 61, 71, 91, and 49 CFR Part 830.

2. Locate information relevant to private pilots in 14 CFR parts 1, 61, 71 and 91.

3. Describe the contents and purposes of 49 CFR part 830.

C. EVALUATION: Students will be evaluated regarding their competence with the objectives of this lesson based upon a mini-exam administered at the beginning of the week 4 class.

D. PRESENTATION OVERVIEW: During this lesson, we shall discuss the following subjects:

1. Definitions and abbreviations; controlled airspace.

2. Certification; Pilots and flight instructors.

3. General operating and flight rules.

4. Maintenance; Preventative maintenance and alterations.

5. National Transportation Safety Board.

E. VALUE OF THE PRESENTATION: Before a person may be certified as a private pilot, he or she must have a thorough understanding of the federal aviation regulations contained in the code of federal regulations.

INSTRUCTOR NOTES	LESSON OUTLINE
II. Throughout this lesson, instructor briefly defines each section, then has students look up answers to specific questions. The questions deal specifically with private pilots.	II. PRESENTATION A. 14 CFR PARTS 1 AND 71: DEFINITIONS AND ABBREVIATIONS; CONTROLLED AIRSPACE. 1. Airport traffic area 2. Ceiling 3. Flight time 4. Flight visibility 5. Pilot in command 6. Federal airway 7. Controlled area 8. Continental control area 9. Control zone 10. Terminal control area 11. Positive control area B. 14 CFR PART 61: CERTIFICATION: PILOTS AND FLIGHT INSTRUCTORS. 1. Required certificate/rating 2. Carriage of narcotic drugs/marihuana 3. Duration of pilot certificates 4. Duration of medical certificates 5. General limitations 6. Pilot logbooks 7. Operations during medical deficiency 8. Recent experience: Pilot in command 9. Falsification, reproduction, alteration of certificates, records, etc.

INSTRUCTOR NOTES	LESSON OUTLINE

10. Change of address
11. Private pilot privileges/limitations

C. 14 CFR PART 91: GENERAL OPERATING AND FLIGHT RULES - GENERAL (SUBPART A).

1. Responsibility of pilot in command
2. Preflight action
3. Careless or reckless operation
4. Liquor or drugs
5. Dropping objects
6. Fastening of safety belts
7. Parachutes and parachuting
8. Portable electronic devices
9. ATC transponder equipment requirements
10. Civil aircraft: certificates required
11. Aircraft airworthiness
12. Aircraft operating limitations/markings
13. Supplemental oxygen
14. Instrument and equipment requirements
15. Limited/restricted aircraft limitations
16. Emergency locator transmitters (ELT)

D. 14 CFR PART 91: GENERAL FLIGHT RULES (SUBPART B).

1. Waivers
2. Operating near other aircraft
3. Right-of-way rules
4. Aircraft speed restrictions

INSTRUCTOR NOTES	LESSON OUTLINE
	5. Acrobatic flight 6. Aircraft lights 7. Complying - ATC clearances/instructions 8. ATC light signals 9. Minimum safe altitudes: General 10. Altimeter settings 11. Flight plan; information required 12. Operating - in vicinity of airport 13. Operation - airport with control tower 14. Operation - airport without control tower 15. Flight in terminal control areas (TCA) 16. Temporary flight restrictions 17. Flight test areas 18. Restricted and prohibited areas 19. Positive control areas; route segments 20. Operations to, or over, Cuba 21. Basic VFR weather minimums 22. Special VFR weather minimums 23. VFR cruising altitude or flight level E. PART 91: MAINTENANCE, PREVENTATIVE MAINTENANCE, AND ALTERATIONS. 1. General maintenance and alterations 2. Maintenance required 3. Carrying persons after repair/alterations

INSTRUCTOR NOTES	LESSON OUTLINE
	4. Inspections/progressive inspections 5. Altimeter system tests/inspections 6. Maintenance records/transfer of records 7. Rebuilt engine maintenance records 8. ATC transponder tests/inspections F. NATIONAL TRANSPORTATION SAFETY BOARD - 49 CFR PART 830 1. General a. Applicability b. Definitions 2. Initial Notification of Aircraft Accidents, Incidents, and Overdue Aircraft a. Immediate notification b. Information to be given in notification 3. Preservation of aircraft wreckage, mail, cargo, and records 4. Reporting of aircraft accidents, incidents, and overdue aircraft. III. SUMMARY A. Review briefly, the main points covered in: 1. 14 CFR Parts 1 and 71 2. 14 CFR Part 61 3. 14 CFR Part 91 a. General operating and flight rules (subpart A)

INSTRUCTOR NOTES	LESSON OUTLINE
	b. General flight rules (Subpart b) c. Maintenance, preventative maintenance and alterations d. National transportation safety board.

LESSON PLAN COVER SHEET

SCHOOL: Flight Training Systems

COURSE: Private Pilot Ground School

WEEK / UNIT NUMBER / TITLE: 4/5.0/Airplane Operations

LESSON NUMBER / TITLE: 5.1/Airplane Operations

PRESENTATION TIME: 3 hours

PRESENTATION METHODS: Lecture; Practical Exercise

TERMINAL PERFORMANCE OBJECTIVES: Upon completion of this lesson, students should be able to:

5.1.1 ANSWER correctly 80% of the Private Pilot Written Examination questions in categories V01-V09.

ENABLING OBJECTIVES: Upon completion of this lesson, students should be able to:

5.1.1.1 DESCRIBE the general aspects of airplane operations.

5.1.1.2 DESCRIBE airplane performance during various aspects of airplane operations.

EVALUATION: Students will be evaluated regarding their competence with the objectives of this lesson based upon the results of a mini-exam administered at the beginning of week 5. The minimum acceptable level of performance is 80%.

REFERENCES:

1. Kirshner, W. K. The Student Pilot's Manual. Iowa State University Press, 1979.

2. Flight Standards Service Flight Training Handbook. U. S. Department of Transportation, Washington, D. C., 1980.

3. ASA Private Pilot Test Book. Seattle, WA: Aviation Supplies and Academics, Inc., 1984.

MATERIALS REQUIRED:

1. Chalk
2. Chalkboard
3. Marker
4. Flipchart
5. Overhead projector
6. Overhead projections
7. One copy of the mini-exam covering week 3 materials for each student
8. One copy of an airplane owners handbook for each student.
9. One toy airplane

SAFETY PRECAUTIONS:

None

HOMEWORK:

1. In references 1 and 2, read the sections dealing with airplane operations.
2. Study the questions in references 3 relevant to this lesson.
3. Prepare for a mini-exam covering this lesson.

PREPARATION DATE:

May, 1984.

REVISION DATES:

1. April 15, 1985.

LESSON TITLE Airplane Operations **PAGE** 1 **OF** 3

INSTRUCTOR NOTES	LESSON OUTLINE
I. Prior to introducing this lesson, administer the quiz covering material presented last week.	I. INTRODUCTION A. TITLE: Airplane Operations B. OBJECTIVES: Upon completion of this lesson, students should be able to: 1. Describe the general aspects of airplane operations. 2. Describe airplane performance during various aspects of airplane operations. C. EVALUATION: Students are evaluated regarding their performance with the objectives of this lesson based upon the results of a mini-exam administered at the beginning of the week 5 class. D. PRESENTATION OVERVIEW: The following subjects are discussed during this session. 1. General aspects of airplane operations. 2. Airplane performance. E. VALUE OF THE PRESENTATION: Aviation safety depends to a large extent upon pilots' understanding of the theoretical and practical aspects of airplane operations. II. A. GENERAL: 1. Preflight postflight safety practices. 2. Flight controls. 3. Wings and empennage. 4. Fuel systems principles. 5. Fuel contamination - prevention elimination.

INSTRUCTOR NOTES	LESSON OUTLINE
	6. Airplane hydraulic systems - airplane electrical systems.
	7. Wake turbulence - causes precautions.
	8. Crosswind takeoff landing practices.
	9. Proper loading of the aircraft.
	10. Recovery from critical flight situations.
	11. Aircraft operating limitations.
	12. High-altitude operations/pressurization.
	13. Use of supplemental oxygen and oxygen equipment.
	14. Midair collision avoidance precautions.
	15. Normal crosswind takeoff and landing practices.
	16. Maximum performance takeoff/landing.
	17. Emergency landings.
	18. Design maneuvering speed.
	19. Taxiing during strong surface winds.
	20. Flap operation.
II. B. Have students look up performance charts in an airplane owners' handbook.	B. PERFORMANCE:
	1. Takeoff charts.
	2. Rate-of-climb charts.
	3. Cruise charts.
	4. Maximum safe crosswind charts.
	5. Landing charts.
	6. Stall speed charts.

INSTRUCTOR NOTES	LESSON OUTLINE

7. Airspeed correction charts.

8. Computing density/pressure altitudes.

9. Effect of density altitude on performance.

10. Critical performance speeds - "V" speeds.

11. Effect of wind and shear on aircraft performance.

12. Bank/speed versus rate/radius of turns.

13. Stall speed versus altitude or attitude

14. Stall speed versus indicated/true airspeed.

15. Obstacle clearance takeoff/landing.

16. Best angle/rate-of-climb.

17. Computations of gross weight/useful load.

18. Computation of center of gravity.

III. SUMMARY

A. Review briefly the main points covered during:

1. General aspects of airplane operations.

2. Airplane performance.

LESSON PLAN COVER SHEET

SCHOOL: Flight Training Systems

COURSE: Private Pilot Ground School

WEEK / UNIT NUMBER / TITLE: 5/6.0/Engine Operations

LESSON NUMBER / TITLE: 6.1/Engine Operations

PRESENTATION TIME: 1.5 hours

PRESENTATION METHODS: Lecture

TERMINAL PERFORMANCE OBJECTIVES: Upon completion of this lesson, students should be able to:

6.1.1 ANSWER correctly 80% of the private pilot written examination questions in categories P01-P23.

ENABLING OBJECTIVES: Upon completion of this lesson, students should be able to:

6.1.1.1 DESCRIBE the general aspects of engine operations.

6.1.1.2 DESCRIBE actual engine operations.

EVALUATION: Students will be evaluated regarding their competence with the objectives of this lesson at the beginning of week 6. The minimum acceptable level of performance is 80%.

REFERENCES:

1. Kirshner, W. K. The Student Pilot's Manual. Iowa State University Press, 1979.

2. Flight Standards Service Flight Training Handbook. U. S. Department of Transportation, Washington, D. C., 1980.

3. ASA Private Pilot Test Book. Seattle, WA: Aviation Supplies and Academics, Inc., 1984.

MATERIALS REQUIRED:

1. Chalk
2. Chalkboard
3. Marker
4. Flipchart
5. Overhead projector
6. Overhead projections
7. One copy of the quiz covering last week's lesson for each student
8. One copy of an airplane owners manual for each student

SAFETY PRECAUTIONS:

None

HOMEWORK:

1. In references 1 and 2, read the sections dealing with engine operations.
2. Study the questions in reference 3 relevant to the lesson.
3. Prepare for a mini-exam covering the lesson.

PREPARATION DATE:

April, 1984.

REVISION DATES:

1. April 15, 1985

LESSON TITLE Engine Operations **PAGE 1 OF 2**

INSTRUCTOR NOTES	LESSON OUTLINE
1. Prior to introducing this lesson, administer the quiz covering material presented last week.	I. INTRODUCTION A. TITLE: Engine Operations B. OBJECTIVES: Upon completion of this lesson, students should be able to: 1. Describe the general aspects of engine operations. 2. Describe actual engine operations. C. EVALUATION: Student competence with the objectives of this lesson will be evaluated based upon the results of a mini-exam administered at the beginning of week 6. D. PRESENTATION OVERVIEW: The following subjects are discussed during this session: 1. General aspects of airplane engine operations. 2. Actual engine operations. E. VALUE OF THE PRESENTATION: Learning the basics of engine operations is an important part of becoming a proficient, safe private pilot. II. PRESENTATION A. GENERAL: 1. Reciprocating engine principles. 2. Carburetion principles. 3. Carburetor/fuel injection principles. 4. Carburetor heat effect on mixture. 5. Lubrication systems. 6. Electrical systems/units. 7. Ignition systems/units.

INSTRUCTOR NOTES	LESSON OUTLINE

8. Fuel systems

9. Propeller principles.

10. Manifold pressure versus RPM.

11. Engine instruments.

12. Effect of density altitude.

B. OPERATION:

1. Engine starting/shutdown procedures.

2. Detonation/preignition causes and effects.

3. Carburetor icing and effect of heat.

4. Engine operating limitations.

5. Use of throttle, propeller, mixture controls.

6. Interpreting engine instruments.

7. Use of proper fuel.

III. SUMMARY

A. Review briefly the main points covered during the discussion of:

1. General aspects of engine operations.

2. Actual engine operations.

LESSON PLAN COVER SHEET

SCHOOL: Flight Training Systems

COURSE: Private Pilot Ground School

WEEK / UNIT NUMBER / TITLE: 5/7.0/Radio Communications

LESSON NUMBER / TITLE: 7.1/Radio Communications

PRESENTATION TIME: 1.5 hours

PRESENTATION METHODS: Lecture; Practical Exercise

TERMINAL PERFORMANCE OBJECTIVES: Upon completion of this lesson, students should be able to:

7.1.1 ANSWER correctly 80% of the private pilot written examination questions in categories N01-N07.

ENABLING OBJECTIVES: Upon completion of this lesson, students should be able to:

7.1.1.1 USE proper communications procedures.

7.1.1.2 DESCRIBE procedures to be used in emergency situations.

7.1.1.3 LOCATE proper communications frequencies

7.1.1.4 USE proper communications frequencies

EVALUATION: Students will be evaluated regarding their facility with the objectives of this lesson based upon the results of a mini-exam administered at the beginning of week 8. The minimum acceptable level of performance is 80%.

REFERENCES:

1. Kirshner, W. K. The Student Pilots' Manual. Iowa State University Press, 1979.

2. Flight Standards Service Flight Training Handbook. U. S. Department of Transportation, Washington, D. C., 1980.

3. ASA Private Pilot Test Book. Seattle, WA; Aviation Supplies and Academics, Inc., 1984

MATERIALS REQUIRED:

1. Chalk
2. Chalkboard
3. Marker
4. Flipchart
5. One copy of the quiz over last week's material for each student
6. One sectional chart for each student
7. One copy of an airport/facility directory for every four students
8. Overhead projector
9. Overhead projections

SAFETY PRECAUTIONS:

None

HOMEWORK:

1. In references 1 and 2, read the sections dealing with radio communications.
2. Study the questions in reference 3 relevant to this lesson
3. Study for a mini-exam over this lesson

PREPARATION DATE:

April 1984

REVISION DATES:

1. April 16, 1985.

LESSON TITLE Radio Communications **PAGE** 1 **OF** 2

INSTRUCTOR NOTES	LESSON OUTLINE

I. INTRODUCTION

A. TITLE: Radio Communications

B. OBJECTIVES: Upon completion of this lesson, students should be able to:

1. Use proper communications procedures

2. Describe procedures to be used in emergency situations.

3. Locate proper communications frequencies.

4. Use proper communications frequencies.

C. EVALUATION: Students are evaluated regarding their competence with the objectives of this lesson based upon the results of a mini-examination administered at the beginning of week 8.

D. PRESENTATION OVERVIEW: The following topics are discussed during this session:

1. VHF Communications.

2. Position reporting.

3. Tower, FSS and ARTCC communications.

4. FSS Communications.

5. Emergency assistance.

6. Lost procedures.

II. PRESENTATION

A. VHF Radio COmmunications/Phraseology.

B. Position Reporting Procedures.

C. Tower/FSS/En Route Advisories/Instructions.

D. FSS Communications Procedures.

INSTRUCTOR NOTES	LESSON OUTLINE
	E. Obtaining Emergency Assistance.
	F. Lost Procedure When Radio is Inoperative.
	G. Use of Proper Communication Frequencies.
	III. SUMMARY
	A. Review briefly the main points covered in sections A-G of the Presentation.

LESSON PLAN COVER SHEET

SCHOOL: Flight Training Systems

COURSE: Private Pilot Ground School

WEEK / UNIT NUMBER / TITLE: 6/8.0/Aviation Weather

LESSON NUMBER / TITLE: 8.1/Weather Basics I

PRESENTATION TIME: 3.0 hours

PRESENTATION METHODS: Lecture; Practical Exercise

TERMINAL PERFORMANCE OBJECTIVES: Upon completion of this lesson, students should be able to:

8.1.1 ANSWER correctly 80% of the private pilot written examination questions in categories K20, K21, K26-K29, K31-K33.

ENABLING OBJECTIVES: Upon completion of this lesson, students should be able to:

8.1.1.1 DESCRIBE the composition and vertical structure of earth's atmosphere.

8.1.1.2 DESCRIBE the temperature measurement system used in aviation and earth's environmental temperature variations.

8.1.1.3 RELATE atmospheric pressure to altimetry.

8.1.1.4 DESCRIBE wind circulation theory.

8.1.1.5 DESCRIBE environmental moisture formation and measurement.

8.1.1.6 DEFINE environmental stability and instability.

8.1.1.7 DESCRIBE cloud types, composition, formation and structure

EVALUATION: Students will be evaluated regarding their competence with the objectives of this lesson at the beginning of week 7. The minimum acceptable level of performance is 80%.

REFERENCES:

1. Kirshner, W. K. The Student Pilots' Manual. Iowa State University Press, 1979.

2. Flight Standards Service Flight Training Handbook. U. S. Department of Transportation, Washington, D. C., 1980.

3. ASA Private Pilot Test Book. Seattle, WA: Aviation Supplies and Academics, Inc., 1984.

MATERIALS REQUIRED:

1. Chalk
2. Chalkboard
3. Marker
4. Flipchart
5. Slide projector
6. Weather slides
7. One copy of the quiz covering last week's lesson, for each student.

SAFETY PRECAUTIONS:

None

HOMEWORK:

1. In references 1 and 2, read the sections dealing with the earth's atmosphere, temperature, atmospheric pressure and altimetry.

2. Study the questions in reference 3 relevant to this lesson.

3. Prepare for a mini-exam covering this lesson.

PREPARATION DATE:

April 3, 1985.

REVISION DATES:

INSTRUCTOR NOTES

1. Prior to introducing the lesson for the week, administer the quiz covering the material presented last week.

LESSON OUTLINE

I. INTRODUCTION

A. TITLE: Weather Basics I

B. OBJECTIVES: Upon completion of this lesson, students should be able to:

1. Describe the composition and vertical structure of earth's atmosphere.
2. Describe the temperature measurement system used in aviation and earth's environmental temperature variations.
3. Relate atmospheric pressure to altimetry.
4. Describe wind circulation theory.
5. Describe environmental moisture formation and measurement.
6. Define environmental stability and unstability.
7. Describe cloud types, composition, formation and structure.

C. EVALUATION: Students will be evaluated regarding their competence with the objectives of this lesson by the results of a quiz given at the beginning of week 7.

D. PRESENTATION OVERVIEW: The following topics are discussed during this session:

1. The earth's atmosphere
2. Temperature
3. Atmospheric pressure and altimetry
4. Wind
5. Moisture

INSTRUCTOR NOTES	LESSON OUTLINE

6. Stability and instability

7. Clouds

E. VALUE OF THE PRESENTATION: A strong relationship exists between pilot understanding of weather and aviation safety.

II. PRESENTATION

A. THE EARTH'S ATMOSPHERE:

1. Composition

2. Vertical structure

3. The standard atmosphere

B. TEMPERATURE:

1. Temperature measurement

2. Heat and temperature

3. Temperature aloft

4. Temperature variation

C. ATMOSPHERIC PRESSURE AND ALTIMETRY:

1. Atmospheric pressure measurements

2. Sea level pressure

3. Station pressure

4. Pressure variation

5. Pressure systems

6. Altimeters and altimeter setting

7. Effect of temperature

INSTRUCTOR NOTES	LESSON OUTLINE

D. WIND:

1. Basic theory of general circulation
2. Convection
3. Pressure gradient force
4. Coriolis force
5. Friction and mountain effects
6. The jet stream
7. Local and small scale winds
8. Large wind system
9. Wind, pressure systems, and weather
10. Wind shear

E. MOISTURE:

1. Measurements
   a. Relative humidity
   b. Dewpoint
2. Change of state
3. Cloud formation precipitation
4. Condensation and sublimation products

F. STABILITY AND INSTABILITY:

1. Adiabatic process
2. Lapse rates
3. Stability determinations
4. Effects of stability or instability

INSTRUCTOR NOTES	LESSON OUTLINE
	G. CLOUDS: 1. Composition 2. Formation and structure 3. Types 4. Recognition/signposts III. SUMMARY A. Review the main points covered during the discussion of: 1. The earth's atmosphere 2. Temperature 3. Atmospheric pressure and altimetry 4. Wind 5. Moisture 6. Stability and instability 7. Clouds

LESSON PLAN COVER SHEET

SCHOOL: Flight Training Systems

COURSE: Private Pilot Ground School

WEEK / UNIT NUMBER / TITLE: 7/8.0/Aviation Weather

LESSON NUMBER / TITLE: 8.2/Weather Basics II

PRESENTATION TIME: 3 hours

PRESENTATION METHODS: Lecture

TERMINAL PERFORMANCE OBJECTIVES: Upon completion of this lesson, students should be able to:

8.2.1 ANSWER private pilot written exam questions in categories K22; K23; K17; K19; K24; K25.

ENABLING OBJECTIVES: Upon completion of this lesson, students should be able to:

8.2.1.1 DESCRIBE the basic principles of air masses

8.2.1.2 DESCRIBE fronts

8.2.1.3 DESCRIBE the types of turbulance that effects airplanes

8.2.1.4 LIST the effects of aircraft icing

8.2.1.5 DESCRIBE thunderstorms and their relationship to aviation

8.2.1.6 LIST weather related obstructions to vision

8.2.1.7 DESCRIBE the effects of aircraft icing

8.2.1.8 DEFINE weather related obstructions to vision

EVALUATION: Students will be evaluated regarding their competence with the objectives of this lesson at the beginning of week 8. The minimum acceptable level of performance is 80%.

REFERENCES:

1. Kirshner, W. K. The Student Pilots' Manual. Iowa State University Press, 1979.

2. Flight Standards Service Flight Training Handbook. U. S. Department of Transportation, Washington, D. C., 1980.

3. ASA Private Pilot Test Book. Seattle, WA: Aviation Supplies and Academics, Inc., 1984.

MATERIALS REQUIRED:

1. Chalk
2. Chalkboard
3. Flipchart
4. Marker
5. Slide projector
6. Weather slides
7. One copy of a quiz, covering last week's lesson, for each student

SAFETY PRECAUTIONS:

None

HOMEWORK:

1. In references 1 and 2, read the sections dealing with air masses, fronts, turbulence, icing, thunderstorms, and obstructions to visions.

2. Study the exam questions in reference 3, related to this lesson.

PREPARATION DATE:

April 2, 1985.

REVISION DATES:

INSTRUCTOR NOTES	LESSON OUTLINE

I. INTRODUCTION

A. TITLE: Weather Basics II

B. OBJECTIVES: Upon completion of this lesson, students should be able to:

1. Describe the basic principles of air masses
2. Describe fronts
3. Describe the types of turbulance that effects airplanes
4. List the effects of icing
5. Describe the effects of aircraft icing
6. Describe thunderstorms and their relationship to aviation
7. List weather related obstructions to vision
8. Define weather related obstructions to vision

C. EVALUATION: Students will be evaluated regarding their competence with lesson objects based upon the results of a quiz given at the beginning of week 8.

D. PRESENTATION OVERVIEW: During this session, we shall discuss the following topics:

1. Air masses
2. Fronts
3. Turbulence
4. Icing
5. Thunderstorms
6. Obstructions to vision

INSTRUCTOR NOTES	LESSON OUTLINE

E. VALUE OF THE PRESENTATION: A strong relationship exists between pilot understanding of weather and aviation safety.

II. PRESENTATION

A. AIR MASSES:

1. Source regions
2. Classification of air masses
3. Air mass modification
4. Summer and winter air mass weather

B. FRONTS:

1. Structures
2. Types
3. Frontal waves and occlusions
4. Frontolysis and frontogenesis
5. Associated weather

C. TURBULENCE:

1. Convective currents
2. Obstructions to wind flow
3. Wind shear
4. Clear air turbulence
5. Categories of turbulence intensities
6. Wake turbulence

INSTRUCTOR NOTES	LESSON OUTLINE
	D. ICING: 1. Ice-producing cloud types 2. Structural ice formation 3. Frost and ground icing 4. Types and intensities of in-flight structural icing 5. Accretion rate of in-flight structural icing 6. Effects of in-flight structural icing 7. Structural aircraft icing and frost on the ground 8. Structural anti-icing and deicing 9. Instrument and powerplant icing 10. Fuel and oil anti-icing E. THUNDERSTORMS: 1. Conditions necessary for formation 2. Structure 3. Classification 4. Hazards 5. Information from radar 6. Tornadoes 7. Do's and don'ts of thunderstorm flying

INSTRUCTOR NOTES	LESSON OUTLINE
	F. OBSTRUCTIONS TO VISION: 1. Fog 2. Low stratus clouds 3. Haze and smoke 4. Blowing obstructions to vision 5. Precipitation 6. Obscured or partially obscured sky III. SUMMARY A. Review the main points covered during the discussion of: 1. Air masses 2. Fronts 3. Turbulence 4. Icing 5. Thunderstorms 6. Obstructions to vision

LESSON PLAN COVER SHEET

SCHOOL: Flight Training Systems

COURSE: Private Pilot Ground School

WEEK / UNIT NUMBER / TITLE: 8/8.0/Aviation Weather

LESSON NUMBER / TITLE: 8.3/Weather Forecasts and Services

PRESENTATION TIME: 3.0 hours

PRESENTATION METHODS: Lecture; Practical Exercise

TERMINAL PERFORMANCE OBJECTIVES: Upon completion of this lesson, students should be able to:

8.3.1 ANSWER correctly 80% of the private pilot written examination questions in categories K01 - K15.

ENABLING OBJECTIVES: Upon completion of this lesson, students should be able to:

8.3.1.1 DESCRIBE the Nation's aviation weather reporting system.

8.3.1.2 LIST the types of weather observations.

8.3.1.3 READ weather charts.

8.3.1.4 DESCRIBE aviation weather reports.

8.3.1.5 LIST weather services availabie to pilots.

8.3.1.6 LIST the information obtained in a complete VFR weather briefing.

8.3.1.7 COMPLETE a flight plan based upon information contained in an actual weather briefing.

EVALUATION: Students will be evaluated regarding their competence with the objectives of this lesson at the beginning of week 9. The minimum acceptable level of performance is 80%.

REFERENCES:

1. Kirshner, W. K. The Student Pilots Manual. Iowa State University Press, 1979.

2. Flight Standards Service Flight Training Handbook. U. S. Department of Transportation, Washington, D. C., 1980.

3. ASA Private Pilot Test Book, Seattle, WA: Aviation Supplies and Academics, Inc., 1984.

MATERIALS REQUIRED:

1. Chalk
2. CHalkboard
3. Marker
4. Flipchart
5. Overhead Projector
6. Overhead projections
7. One copy of the quiz over last week's material for each student

SAFETY PRECAUTIONS:

None

HOMEWORK:

1. In references 1 and 2, read the sections dealing with aviation reporting system, weather observations, weather charts, weather forecasts, weather services for pilots and information in a weather briefing.
2. Study the questions in reference 3 relevant to this lesson.
3. Prepare for a mini-exam over this lesson.

PREPARATION DATE:

April 10, 1985.

REVISION DATES:

LESSON TITLE Weather Forecasts and Services **PAGE 1 OF 4**

INSTRUCTOR NOTES	LESSON OUTLINE
1. Prior to introducing the lesson for this week, administer the quiz covering the material presented last week.	I. INTRODUCTION A. TITLE: Weather Forecasts and Services B. OBJECTIVES: Upon completion of this lesson, students should be able to: 1. Describe the nation'a aviation weather reporting system. 2. List the types of weather observations. 3. Read weather charts. 4. Describe aviation weather reports. 5. List weather services available to pilots. 6. List the information obtained in a complete VFR weather briefing. 7. Complete a flight plan based upon information contained in an actual weather briefing. C. EVALUATION: Students will be evaluated regarding their competence with the objectives of this lesson based upon a mini-exam administered at the beginning of the week #9 class. D. PRESENTATION OVERVIEW: During this lesson, we shall discuss the following subjects: 1. The nation's weather reporting system. 2. Weather observations. 3. Weather charts. 4. Aviation weather forecasts. 5. Weather services to pilots. 6. Determining cloud-heighth from weather reports. 7. Information in a weather briefing.

INSTRUCTOR NOTES	LESSON OUTLINE

E. VALUE OF THE PRESENTATION: A strong relationship exists between pilot understanding of weather and aviation safety.

II. PRESENTATION

A. THE NATION'S AVIATION WEATHER REPORTING SYSTEM:

1. Observations
2. Meteorological centers and forecast office
3. Service outlets
4. Users

B. WEATHER OBSERVATIONS:

1. Surface weather observations.
2. Pilot weather reports (PIREPS)
3. Weather radar observations
4. Upper air observations

C. WEATHER CHARTS:

1. Weather depiction charts
2. Surface weather charts
3. Constant pressure charts
4. Winds aloft charts
5. Radar summary charts
6. Prognostic surface and prognostic constant pressure charts
7. Prognostic significant weather charts
8. Density altitude charts

INSTRUCTOR NOTES	LESSON OUTLINE
	D. AVIATION WEATHER FORECASTS: 1. Terminal forecasts (FT) 2. Area forecasts (FA) 3. Winds & temperatures aloft forecasts (FD) 4. TWEB route forecasts and synopses 5. In-flight weather advisories (WA. WS. WST) 6. Severe weather outlooks 7. Severe weather forecasts 8. Surface analyses and prognoses E. WEATHER SERVICES TO PILOTS: 1. FSS briefing 2. Automatic terminal information service (ATIS) 3. Pilot's automatic telephone weather answering service (PATWAS) 4. Transcribed weather broadcasts (TWEB) 5. En route flight advisory service 6. Scheduled weather broadcasts F. DETERMINING CLOUD-HEIGHT FROM WEATHER REPORTS. G. INFORMATION IN A WEATHER BRIEFING. H. PRACTICAL EXERCISE.
II. H. Have students obtain a complete weather briefing from an FSS for a cross-country flight and then begin planning the flight.	

INSTRUCTOR NOTES	LESSON OUTLINE
	III. SUMMARY A. Review the main points covered during the discussion of: 1. The nation's aviation weather reporting system. 2. Weather observations. 3. Weather charts. 4. Aviation weather forecasts. 5. Services to pilots. 6. Determining cloud-heighth from reports. 7. Information in a weather briefing.

LESSON PLAN COVER SHEET

SCHOOL: Flight Training Systems

COURSE: Private Pilot Ground School

WEEK / UNIT NUMBER / TITLE: 9/9.0/Navigation

LESSON NUMBER / TITLE: 9.1/Navigation

PRESENTATION TIME: 3 hours

PRESENTATION METHODS: Lecture

TERMINAL PERFORMANCE OBJECTIVES: Upon completion of this lesson, students should be able to:

9.1.1 ANSWER 80% of the private pilot written examination questions in categories L01-L12; M01-M16; N01-NC7.

ENABLING OBJECTIVES: Upon completion of this lesson, students should be able to:

9.1.1.1 DESCRIBE sectional charts in detail

9.1.1.2 DESCRIBE how pilotage is used in cross-country flying

9.1.1.3 DESCRIBE the important aspects of dead reckoning

9.1.1.4 USE wind triangles and navigation computer principles

9.1.1.5 DESCRIBE the important aspects of radio navigation

EVALUATION: Students will be evaluated regarding their competence with the objectives of this lesson at the beginning of week 10. The minimum acceptable level of competence is 80%.

REFERENCES:

1. Kirshner, W. K. The Student Pilots Manual. Iowa State University Press, 1979.
2. Flight Standards Service Flight Training Handbook. U. S. Department of Transportation. Washington, D.C., 1980.
3. ASA Private Pilot Test Book. Seattle, WA: Aviation Supplies and Academics, Inc., 1984.

MATERIALS REQUIRED:

1. Chalk
2. Chalkboard
3. Marker
4. Flipchart
5. Overhead projector
6. Overheat projections
7. One sectional chart for every 4 students
8. One copy of the quiz covering last week's lesson for each student
9. One navigation plotter for each student
10. One flight computer for each student

SAFETY PRECAUTIONS:

None

HOMEWORK:

1. In references 1 and 2, read the sections dealing with sectional charts, pilotage, dead reckoning, navigation computer principles and radio navigation.
2. Study the questions in reference 3 relevant to this lesson.
3. Prepare for a mini-exam covering this lesson.

PREPARATION DATE:

April 19, 1985.

REVISION DATES:

INSTRUCTOR NOTES	LESSON OUTLINE

I. INTRODUCTION

A. TITLE: Navigation

B. OBJECTIVES: Upon completion of this lesson, students should be able to:

1. Describe sectional charts in detail.
2. Describe how pilotage is used in cross-country flying.
3. Describe the important aspects of dead reckoning.
4. Use wind triangles and navigation computer principles.
5. Describe the important aspects of radio navigation.

C. EVALUATION: Students will be evaluated regarding their competence with the objectives of this lesson based upon the results of a mini-exam administered at the beginning of week 9.

D. PRESENTATION OVERVIEW:

The following topics will be discussed during this lesson:

1. General aspects of air navigation.
2. Pilotage.
3. Dead reckoning.
4. Wind triangles/navigation computer principles.
5. Radio navigation.

E. VALUE OF THE PRESENTATION: Cross-country flying is possible only after a pilot understands the basics of air navigation.

INSTRUCTOR NOTES	LESSON OUTLINE

II. PRESENTATION

A. GENERAL ASPECTS OF AIR NAVIGATION:

1. Sectional chart interpretation.

a. Topographic information

b. Symbols/obstruction heights/ elevations

c. Relief

d. Aeronautical data

e. Navigation aids

f. Controlled airspace and special use airspace markings

2. Time zones and 24-hour system.

B. PILOTAGE:

1. Plotting a course.

2. Identifying landmarks.

C. DEAD RECKONING:

1. Measuring courses.

2. Measuring distances.

3. Effect of wind on navigation.

4. Magnetic variation and deviation.

5. True airspeed and groundspeed.

6. True course, magnetic course.

7. Wind direction.

INSTRUCTOR NOTES	LESSON OUTLINE

D. WIND TRIANGLES/NAVIGATION COMPUTER PRINCIPLES:

1. True course and groundspeed.
2. True heading and groundspeed.
3. Magnetic heading and groundspeed.
4. True course and true airspeed.
5. Wind direction and speed.
6. Time, speed, distance.
7. Fuel consumption.
8. Conversions-temperatures, speeds, distances, altitudes.
9. Climbs and descents.
10. Density altitude.

E. RADIO NAVIGATION:

1. Characteristics of VOR facilities.
2. Tuning VOR receivers.
3. Identifying VOR stations.
4. VOR interpretation/orientation.
5. Intercepting VOR radials.
6. Tracking VOR radials.
7. Groundspeed checks using VOR radials.
8. VOR frequency interference.
9. VOR test signals/VOR receiver checks.
10. Characteristics of ADF facilities.
11. Turning ADF receivers.

INSTRUCTOR NOTES	LESSON OUTLINE

12. identifying stations used for ADF.
13. ADF interpretation/orientation.
14. Intercepting ADF bearings.
15. Tracking ADF bearings or "homing".
16. Nondirectional radiobeacons.
17. Distance measuring equipment.
18. Transponder use.
19. Emergency locator beacons (ELT).
20. Direction finding (DF).

III. SUMMARY

A. Review the main points covered during the discussions of:

1. General aspects of air navigation.
2. Pilotage.
3. Dead Reckoning.
4. Wind triangles/Navigation computer principles.
5. Radio navigation.

LESSON PLAN COVER SHEET

SCHOOL: Flight Training Systems

COURSE: Private Pilot Ground School

WEEK / UNIT NUMBER / TITLE: 10/9.0/Navigation

LESSON NUMBER / TITLE: 9.2/Cross Country Planning

PRESENTATION TIME: 3 hours

PRESENTATION METHODS: Lecture; Practical Exercise

TERMINAL PERFORMANCE OBJECTIVES: Upon completion of this lesson, students should be able to:

9.2.1 PLAN VFR cross country flights

ENABLING OBJECTIVES: Upon completion of this lesson, students should be able to:

9.2.1.1 USE flight computers correctly

9.2.1.2 USE plotters correctly

9.2.1.3 APPLY weather briefing information to cross country planning

9.2.1.4 USE sectional charts correctly for cross country planning purposes

9.2.1.5 COMPLETE cross country planning forms

9.2.1.6 FILE VFR flight plans

9.2.1.7 USE airport facilities directories

EVALUATION: Students will be evaluated regarding their competence with the lesson objectives based upon the quality of the completed flight plans. The plans must be complete and without error.

REFERENCES:

1. Kirshner, W. K. The Student Pilots Manual. Iowa State University Press, 1979.

2. Flight Standards Service Flight Training Handbook. U. S. Department of Transportation. Washington, D. C., 1980.

3. ASA Private Pilot Test Book. Seattle, WA: Aviation Supplies and Academics, Inc., 1984.

MATERIALS REQUIRED:

1. Chalk
2. Chalkboard
3. Flip chart
4. Marker
5. One sectional chart for each student
6. One navigational plotter for each student
7. One flight computer for each student
8. One copy of an airport facilities directory for each student
9. Two flight planning forms for each student

SAFETY PRECAUTIONS:

None

HOMEWORK:

1. Prepare for the FAA Private Pilot Written Examination.

PREPARATION DATE:

April 11, 1985.

REVISION DATES:

INSTRUCTOR NOTES	LESSON OUTLINE

I. INTRODUCTION

A. TITLE: Cross Country Planning

B. OBJECTIVES: Upon completion of this lesson, students should be able to:

1. Use sectional charts
2. Apply weather briefing data to cross country planning
3. Use plotters
4. Use flight computers
5. Complete cross country planning forms
6. File flight plans

C. EVALUATION: Students will be evaluated regarding their competence with the objectives of this lesson based upon the quality of the complete plan they develop for a cross country flight.

D. PRESENTATION OVERVIEW: The following topics will be covered during this lesson:

1. Completion of cross country planning forms
2. Filing flight plans
3. Cross country planning exercise

E. VALUE OF THE PRESENTATION: If pilots are to make cross country flights safely, they must be able to correctly plan such flights.

II. PRESENTATION

A. COMPLETION OF CROSS COUNTRY PLANNING FORMS

1. Sectional

INSTRUCTOR NOTES	LESSON OUTLINE
	2. Weather briefing
	3. Information required by the form
	B. FILING FLIGHT PLANS:
	1. Completion of the form
	2. How to file
	3. Where to file
	4. When to file
II. C. Students should plan a three leg flight with one leg at least 100 nautical miles long and the total flight at least 300 nautical miles long	C. CROSS COUNTRY PLANNING EXERCISE
	III. SUMMARY
	A. Review briefly the main points covered during the discussion of:
	1. Completion of the cross country planning forms
	2. Filing flight plans
	B. Discuss each flight plan with the student pilot who did the planning